NON-FINAL REJECTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8/01/2011 has been entered.

Response to Arguments

2. Applicant's arguments filed 8/01/2011 have been fully considered but they are not persuasive.

3. In response to Applicant's arguments regarding the amended limitation of the material of the intermediate layer, the amended limitation of claim 23, appears to claim that alloys including at least Si, could form the intermediate layer. Furthermore, the arguments presented on pages –4 were considered, however the claim language does not clearly restrict the intermediate layer material to **not include** materials such as sendust (Fe-Al-Si alloy), such as disclosed by Sato. Therefore, the rejection is modified to apply to the amended claim.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 23, 32-33, 35-39 and 44-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al. (US 5894388) in view of Applicant admitted prior art (AAPA).

Re claims 23 and 36-37: Sato discloses a thin-film magnetic head substrate (see Fig.1 for instance) comprising:

a base 12 with a principal surface (top surface of 12 in Fig.1); and

an undercoat film 3, which is made of an aluminum oxide and which covers the principal surface of the base, an electrical/magnetic transducer 1 being provided on the undercoat film;

wherein the substrate further includes an intermediate layer 2 between the principal surface of the base and the undercoat film;

the intermediate layer is made of a material other than the aluminum oxide (such as sendust (Fe-Al-Si alloy) or permalloy (Fe-Ni alloy) for instance in col.6, lines 15-19), has been patterned so as to make a portion of the principal surface of the base contact with the undercoat film (col.6, lines 3-26), and has an opening where the

electrical/magnetic transducer is not located (the area where layer 2 does not cover base 12); and

the base is a single monolithic layer (as shown in Fig.1) arranged to be the bottom-most layer of the thin-film magnetic head substrate; and

in a region other than the opening of the intermediate layer (any other region of layer 2 as shown in Fig.1-2), as viewed in a direction perpendicular to the principal surface of the base (Fig.2):

the intermediate layer is present between the undercoat film and the base (as interpreted from Fig.1); and

the undercoat film is not in contact with the base (Fig.1), and

the intermediate layer 2 is made of a material selected from the group consisting of Cu, alloys including Cu, Cr, and alloys including Cr, and Si (sendust includes Fe-Al-Si alloy).

However, Sato **fails to explicitly disclose**:

the ceramic base, as recited in claim 23.

Furthermore Sato **fails to explicitly disclose**:

wherein the ceramic base is made of an alumina-based ceramic material, as recited in claim 36

or

wherein the ceramic base further includes a carbide or nitride carbonate of a metal, as recited in claim 37.

AAPA clearly suggests that slider substrates (pages 4 [0007]) are typically made of ceramic based materials such as Al_2O_3-TiC, due to its excellent thermal and mechanical properties necessary for slider bodies.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the base 1 of Sato using the material as suggested by AAPA in order to obtain a slider body with excellent properties required of a slider body.

Furthermore, Sato as modified by AAPA discloses the claimed invention except for explicitly stating the alumina-based ceramic material *includes 24 mol % to 75 mol % of* α-Al_2O_3 *and at most 2 mol % of an additive*.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the ceramic based material composition to improve the thermal and/or mechanical properties of the slider body, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416 (CCPA 1960).

Re claims 32 and 35: Sato discloses the claimed invention except for wherein the intermediate layer has a thickness of 1 nm to 1 μm, as recited in claim 32 and wherein the undercoat film has a thickness of 10 nm to 1 μm, as recited in claim 35.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the thicknesses of each layer for the purpose of changed

the conductive and/or magnetic characteristics of each layer, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233 (CCPA 1955).

Re claim 33: Sato further discloses wherein the intermediate layer 2 is made of a metal film or a Si film (sendust or permalloy in col.6, lines 15-19).

Re claim 38: Sato further discloses the thin-film magnetic head slider (as shown in Fig.2) comprising: the thin-film magnetic head substrate of claim 23; and the electrical/magnetic transducer, which is provided on the undercoat film of the thin-film magnetic head substrate (as discussed above regarding claim 23).

Re claim 39: Sato further discloses a hard disk drive comprising the thin-film magnetic head slider of claim 38 (col.1, lines 6-21).

Re claim 44: Sato also discloses (for the same reasons as claim 23) a method of making a thin-film magnetic head slider, the method comprising the steps of:

preparing the thin-film magnetic head substrate of claim 23 (as discussed above for claim 23); and

fabricating the electrical/magnetic transducer on the undercoat film (as shown in Fig.1).

Re claim 45: Sato further discloses wherein the intermediate layer is a flat single layer that is formed on the principal surface of the ceramic base.

Re claim 46: Sato further discloses wherein the intermediate layer is in contact with both of the undercoat film and the ceramic base in the region other than the opening of the intermediate layer, as viewed in a direction perpendicular to the principal surface of the ceramic base (as shown in Fig.1).

7. Claims 23, 25-26, 36-39 and 44-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edelman et al. (US 2005/0174687) in view of Sato further in view of AAPA. The teachings of Sato and AAPA have been discussed previously.

Re claims 23 and 36-37: Edelman discloses a thin-film magnetic head substrate (see Fig.5 for instance) comprising:

a base 118 with a principal surface (top surface of 118 in Fig.5); and

an undercoat film 134, which is made of an insulating material and which covers the principal surface of the base, an electrical/magnetic transducer 116 being provided on the undercoat film;

wherein the substrate further includes an intermediate layer 122 between the principal surface of the base and the undercoat film;

the intermediate layer is made of a material other than the aluminum oxide (lower pole 122 cannot be made of an insulating material such as aluminum oxide, see [0029-

0030]), has been patterned so as to make a portion of the principal surface of the base contact with the undercoat film (Fig.5), and has an opening where the electrical/magnetic transducer is not located (the area where layer 122 does not cover base 118); and

the base is a single monolithic layer (as shown in Fig.5) arranged to be the bottom-most layer of the thin-film magnetic head substrate; and

in a region other than the opening of the intermediate layer (any other region of layer 122 as shown in Fig.5), as viewed in a direction perpendicular to the principal surface of the base (Fig.5):

the intermediate layer is present between the undercoat film and the base (as interpreted from Fig.5); and

the undercoat film is not in contact with the base (Fig.5).

Furthermore, Edelman mentions that insulating materials such as aluminum oxide can be used for the insulating layers and composite materials of AlTiC, TiC, and aluminum oxide can be used for the substrate [0026]. Additionally, Edelman discloses that layer 122 is made up of alloys primarily including Fe, Ni, and/or Co [0029].

However, Edelman **fails to explicitly disclose**:

the ceramic base, as recited in claim 23.

Furthermore Edelman **fails to explicitly disclose**:

wherein the ceramic base is made of an alumina-based ceramic material, as recited in claim 36

or

wherein the ceramic base further includes a carbide or nitride carbonate of a metal, as recited in claim 37.

AAPA clearly suggests that slider substrates (pages 4 [0007]) are typically made of ceramic based materials such as Al_2O_3-TiC, due to its excellent thermal and mechanical properties necessary for slider bodies.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the base 118 of Edelman using the material as suggested by AAPA in order to obtain a slider body with excellent properties required of a slider body.

Furthermore, Edelman as modified by AAPA discloses the claimed invention except for explicitly stating the alumina-based ceramic material *includes 24 mol % to 75 mol % of* α-Al_2O_3 *and at most 2 mol % of an additive*.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the ceramic based material composition to improve the thermal and/or mechanical properties of the slider body, since it has been held to be within the general skill of a worker in the art to select a known material (as suggested by AAPA) on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416 (CCPA 1960).

Lastly, Edelman **fails to explicitly disclose**:

the intermediate layer is made of a material selected from the group consisting of Cu, alloys including Cu, Cr, and alloys including Cr, and Si, as recited in claim 23.

Sato as discussed above, clearly suggests using sendust or permalloy for a magnetic layer, such as a shield layer. Sendust includes Fe-Al-Si material.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to at least try using sendust alloy (including Si) as suggested by Sato as the magnetic material used in the magnetic pole layer of Edelman for the purpose obtaining a strong magnetic pole layer for the magnetic sensor.

Re claim 25: Edelman further discloses wherein the electrical/magnetic transducer provided on the undercoat film includes:

a lower magnetic shield film 130;

a magneto-resistive element 132 arranged on the lower magnetic shield film; and

an upper magnetic shield film 128, which has been deposited on the lower magnetic shield film so as to cover the magneto-resistive element, and wherein the intermediate layer has been patterned so as to cover the entire projection of the magneto-resistive element on the principal surface of the ceramic base (Fig.5).

Re claim 26: Edelman further discloses wherein the intermediate layer has been patterned so as to cover the entire projection of the lower magnetic shield film on the principal surface of the ceramic base (Fig.5).

Re claim 38: Edelman further discloses the thin-film magnetic head slider (as shown in Fig.5) comprising: the thin-film magnetic head substrate of claim 23; and the

electrical/magnetic transducer, which is provided on the undercoat film of the thin-film magnetic head substrate (as discussed above regarding claim 23).

Re claim 39: Edelman further discloses a hard disk drive comprising the thin-film magnetic head slider of claim 38 [0001-0004].

Re claim 44: Edelman also discloses (for the same reasons as claim 23) a method of making a thin-film magnetic head slider, the method comprising the steps of:

preparing the thin-film magnetic head substrate of claim 23 (as discussed above for claim 23); and

fabricating the electrical/magnetic transducer on the undercoat film (as shown in Fig.1).

Re claim 45: Edelman further discloses wherein the intermediate layer is a flat single layer that is formed on the principal surface of the ceramic base.

8. Claims 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato in view of AAPA further in view of Hirooka (US 2003/0036025; hereinafter Hirooka '025). The teachings of Sato as modified by AAPA have been discussed previously.

Re claims 27-29: Sato as modified by AAPA disclose the claimed invention except for:

wherein a portion of the intermediate layer makes an alignment mark for use in positional alignment, as recited in claim 27;

wherein a portion of the intermediate layer makes a pattern representing identification information, as recited in claim 28; or

wherein the identification information includes information about the identity of the ceramic base, as recited in claim 29.

Hirooka '025 teaches a technique of recording different identifiers as used on thin-film magnetic heads (see abs; para.0004-0009). Furthermore, Hirooka '025 teaches the process of recording identifiers on an Al_2O_3-TiC type ceramic wafer 60 by placing a thin film 65 of metal material on a top surface of the ceramic layer 60 (para.0105-0107; Fig.8A-8D). The thin metal film 65 is patterned to a desired identifying mark, using the process illustrated in Fig.8A-8D. Additionally, Hirooka '025 suggests a method of placing identifier on multiple ceramic wafers (para.0086).

Therefore, a person of ordinary skill in the art would have recognized that applying the known technique of recording an identifier made of a metallic film as taught by Hirooka '025 and placing such identifier film over a surface of the ceramic layer of the magnetic thin film substrate of the Sato and AAPA for the purpose identifying the slider, would have yielded predictable results and would provide one way to identify the slider.

9. Claims 30-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato in view of AAPA and Hirooka '025 further in view of Hirooka (JP 2004-127442; hereinafter Hirooka '442). The teachings of Sato as modified by AAPA and Hirooka '025 have been discussed previously.

Re claims 30-31: Sato as modified by AAPA and Hirooka '025 disclose the claimed invention except for:

wherein the pattern representing the identification information has been recorded on a plurality of areas of the principal surface of the ceramic base, mutually different pieces of the information being distributed to the respective areas, as recited in claim 30; or

wherein the areas are arranged so as to form multiple different thin-film magnetic heads when the substrate is divided, as recited in claim 31.

The prior art of Hirooka '442 also teaches the known technique of placing an identification information on a surface of the substrate layer of a slider or multiple sliders during manufacturing (para.0049-0055). Furthermore, Hirooka '442 teaches that the substrate can include an alignment mark (para.0076-0077) on the slider or the identification information is unique to each substrate and that such information can be placed on multiple slider bodies during manufacturing (Fig.1-5) (see para.0020-0031), as recited in claims 30-31.

Therefore, a person of ordinary skill in the art would have recognized that applying the known technique of using the alignment mark or identification information pattern for slider substrates layers, either on the substrate principal layer or other layers placed on the substrate, for the purpose of aligning the slider and providing identification data for the slider would have yielded predictable results and would have eased the manufacturing process of the slider substrates.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CARLOS E. GARCIA whose telephone number is (571)270-1354. The examiner can normally be reached on M-Th 9am-5pm F 9am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad H. Ghayour can be reached on 571-272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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September 8, 2011